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ETHNOLOGY.—*New light on the early history of the Siouan peoples.*[1]

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Relationship between several of the languages of the western Siouan group was recognized by French missionaries about the beginning of the eighteenth century. In 1836 Gallatin brought most of the tribes of this division together under the name afterwards adopted by Powell in his well-known scientific classification.[2]

In the year 1870 Dr. Horatio Hale had obtained from a few surviving members of the Tutelo tribe incorporated with the Iroquois a vocabulary demonstrating beyond question the Siouan connection of this former Virginian people, and the results of his work were published in the *Proceedings of the American Philosophical Society* for 1883–4, pp. 1-47. Dr A. S. Gatschet of the Bureau of American Ethnology visited the Catawba tribe of South Carolina in 1881 and on the basis of a considerable body of linguistic material then collected suggested a Siouan relationship for them, a suggestion which subsequent researches by Dr. J. O. Dorsey, the Siouan specialist of the Bureau, entirely confirmed.[3] With these two languages as a basis further investigations by the same students and by Mr. James Mooney resulted in the identification of a large eastern Siouan area in the piedmont region of Virginia and the Carolinas, including at the time of the English colonization about thirty distinct tribes. The results of this work were incorporated by Mr. Mooney into a bulletin entitled "The Siouan Tribes of the East" which remains a standard authority on the subject today.[4]

[1] Received January 3, 1923.

[2] 7th Ann. Rep. Bur. Amer. Ethnol., 111–112.

[3] Ibidem.

[4] Bur. Amer. Ethnol. Bull. 22.

In the fall of 1886 Dr. Gatschet, in the course of linguistic researches among the tribal remnants of Louisiana, came upon a few individuals of the Biloxi tribe, formerly occupying the neighborhood of the bay of that name in southern Mississippi. The vocabulary collected by him showed undoubted Siouan affinities, and in 1892 and 1893 Dr. Dorsey made visits to the same people and collected a large amount of material from them which was edited by the writer after Dr. Dorsey's death and published in Bulletin 47.[5]

In 1908, among the remnant of Tunica Indians living near Marksville, Louisiana, the writer happened to meet with a single individual of the Ofo, or Ofogoula, tribe, previously supposed to have been Muskhogean, and the vocabulary collected by him, although relatively small, proves without doubt that this little tribe was also of the great Siouan connection. More detailed information regarding both the Ofo and the Biloxi will be found in the Bulletin just mentioned.[6]

A superficial comparison between the Biloxi and Ofo languages on one hand and the remaining Siouan dialects on the other, made when the material from the first two was being prepared for publication, brought out the rather surprising fact that, intead of resembling the Siouan language nearest them, Quapaw, they were connected rather with the Tutelo of Virginia and the Dakota of the far north. At this time it was assumed that since Tutelo and Catawba were both dialects of the eastern Siouan group they must be more closely related to each other than was either to any language of another group and that what was true of Tutelo must necessarily be true of Catawba. A few years later, however, the writer paid a visit to the Catawba remnant in South Carolina and in connection with his visit the material collected by Dr. Gatschet about forty years ago was reëxamined. Almost immediately a striking difference was perceived, not merely as between Catawba and Tutelo but as between Catawba and all other Siouan languages. The same conclusion has been reached by another investigator in the same field, Dr. Frank G. Speck, who also feels certain that the differences had a cultural aspect. Catawba is evidently a survival of a peculiar southeastern Siouan group which took in all of the Siouan tribes of South Carolina and probably most of those of North Carolina as well.

In order to place the relationship between these languages on a firm basis the writer has taken Hale's comparative vocabulary of Tutelo, Dakota, and Hidatsa as a basis and added to it the Biloxi, Ofo,

[5] Bur. Amer. Ethnol. Bull. 47.
[6] Ibidem, pp. 5–12.

Catawba, Winnebago, and Quapaw equivalents, so far as this could be done without a too great expenditure of time. He has also included the few words of Woccon preserved to us in the vocabulary of Lawson.[7] This comparison leads to the following conclusions:

1. Woccon must be classed with Catawba rather than Tutelo. Of about fifty-nine opportunities to compare Woccon with the other languages resemblances to Catawba appeared to exist in about twenty-six cases, while there were fourteen with Tutelo, Biloxi, and Hidatsa, fifteen with Dakota, and twelve with Ofo.

2. Leaving Woccon out of consideration, Catawba stands strikingly apart from the rest. In order to reënforce this fact I have made a table (p. 36) containing more than forty cases in which all or a large part of the Siouan dialects compared agree with each other and differ, sometimes strikingly, from Catawba.

3. As might have been anticipated, Biloxi and Ofo are quite closely related. Their nearest congeners in the north are, upon the whole, the Tutelo, but it is singular that their next closest relatives should be the comparatively distant Dakota. The Omaha-Osage division is decidedly farther removed. The testimony yielded by the languages of the Biloxi and Ofo thus points directly away from those Siouan tribes nearest them in geographical position both east and west and toward the northern tribes of each of those divisions.

How this puzzling inversion could have been brought about it was impossible to suggest until recently, and the past history of the Biloxi is, indeed, still shrouded in mystery. On the map of Baron de Crenay compiled in 1733 we find the name "Bilouchy" affixed to a town at the mouth of a small creek on the western side of Alabama River, in what is now Wilcox County, Alabama.[8] This may indicate a stage in the southward migration of the Biloxi tribe; it is the only clew we have.

Our knowledge of the past movements of the second southern Siouan tribe, the Ofo, is not much more assured, but recently data has accumulated tending toward a conclusion interesting in itself to the ethnologist and of cardinal importance to students of the archaeology of southern Ohio and the neighboring sections.

As stated in my account of the Ofo in Bulletin 47 this tribe is called by the Tunica Ûcpi (Ûshpee),[9] and we know that this appellation is an old one because it appears four times in the very earliest Louisiana documents, in the several forms "Ouispe," "Oussipés," "Ounspik"

[7] Lawson, Hist. of Carol., 367–377.
[8] See map accompanying Bur. Amer. Ethnol. Bull. 73.
[9] Bur. Amer. Ethnol. Bull. 47: 10–11.

TABLE TO ILLUSTRATE THE

ENGLISH	CATAWBA	BILOXI	OFO	TUTELO
alive, live	wari	unoxĕ	nônki	inī
all	nitem(p)	ohi	tcupi	hūk
ax	pase'	aⁿsēpi	aⁿfhepi	nisēp
ball	wap	nitapi	(plocka)	tapi
bear	nume	oⁿṭi	uⁿthi	mūnti
black	hawōktci	sȧpi	ifthĕpi	asēpi
blue	wu, wi	tohi	ithohi	asōti
bone	sap	aho	aho	wahōi
dance, to	ibari	ditci	litci	wagitci
day	yap	napi	noⁿpi	nahambe
dead, die	ware	ṭe	thĕ	tē
dog	taⁿsi	tcûñki	ątchuñki	tcoñki
ear	duksa	nixuxwi	nashusi	naxōx
eat, to	hara, ra	duti	tuti	lūti
father	nane	adi	athi	eāti
fire	iᵐpiᵉ	peti	apheti	pītc
fish	yī	o	ho	wihōi
foot	yipa	isi (yukpe, leg)	ĭfhi	ici
four	paprere	topa	topa	tōpa
ghost	yīᵉwe	anatci	naⁿtci	wanuntcī
good	kuni, kuri	pi	tcema	pī
grandfather	tatewa	kaⁿxo	čtikoⁿso	ekuⁿi
grandmother	istcū	ḳûⁿḳûⁿ	ĭkoni	higūⁿ
great	patki	taⁿ	ithoⁿ	itáⁿi
hair	hisi	hiⁿ	ihi	natóⁿwe
hand	iksa	tcak	itcaki	hāki
he	o	e, i	i	e, i
head	iska	pa	.....	pasūye
house	sūk	ti	ąthi	atī
I, me	sa-, ne-	ñk-	ba	ma
iron	dorob	masȧ	amôⁿfi	maⁿs
kill, to	gua	kte (to hit)	kthĕ	ktē
mother	istci	ûⁿni	oⁿni	īna
mouth	sumu	ihi	ihi	ihī
neck	pok	dodi	itcoti	tasĕi
one	nĕpĕ	soⁿsa	nûfha	noⁿç
pound, to	himiᵉ	pčhe	phe	pahē
rain	ukso	xohi	ashohi	xawōi
sister (man's)	hatcu	tañki	ithoⁿfka	tahañk
sit, to	waⁿ	nañḳi	nôñki	(maha) nañka
six	dipkrare	akȧxpĕ	akȧpĕ	akāsp
tobacco	umpa	yani	itcani	yēhni
tooth	yap	iⁿsu	ifha	ihī
town	wē	taⁿ	iⁿtufa	māmpī
tree	yȧp	ayaⁿ	itcaⁿ	onī, wiēⁿ
us, we	hȧ	nḳixtu	oⁿ	mae, wae
water	yēhič	ani	ani	manī
yellow	wuyantkare	si	fhi	sīi

DISTINCTIVENESS OF THE CATAWBA DIALECT

DAKOTA	HIDATSA	WINNEBAGO	QUAPAW
ni	hiwakatsa	ni	ni
iyuxpa	xukaheta	ana^{n}tc	zani; anahitĕ, juhi (many)
o^{n}spe	maipsa	maza	i^{n}spe
tapa	măotâpi	.....	.....
mato	daxpitsi	ho^{n}tc; ma^{n}tco (grizzly)	wasa (blk.); ma^{n}tu (grizzly)
sapa	cipi	sĕp	cape; sa, sewe
to; sota	tohi	tco	tu
hu	hidu	hucerigera, hucarek	wahi
watci	kidiçi	waci	uja
a^{n}pé	mape	ha^{n}ba	hă^{n}ba, hû^{n}ba
ta	te	ṭ'e	ṭ'e
cunka	macuka	cûñga	cuñkĕ
noghe	akux	natca	na^{n}tă
yuta	duti	warutc-	dɛ́até
ate	ate	hia^{n}tci	edɛ́ate (his f.)
peta	.....	petca	petĕ
hogha^{n}	mua	ho	hu
siha	itsi	si, si	si
topa	topa	tcop	tuwa
wanaghi	nokidaxi	wanaxi	wanaxe
wacte; pi	tsûki	pi	huta^{n}, uxta
tuñka^{n}cida^{n}	adutaka	hitcoke	etiką^{n}
ku^{n}sitku	iku	hiko	ekă^{n}
tañka	ixtia	xete, xata	tañka
hi^{n}	hi	natcu	hi^{n}; nijiha (kĕ) (head hair)
cake (claw)	caki	naba	na^{n}pe
iye	i	e	e
pa	atu	nasu; pa-(ksi) (head bent)	pahi
tipi	ati	tcija^{n}	ti
wa, ma	ma	ne	wie (I)
maza	uetsa	maza-ra	măzĕ
kte	kitahe	.....	.....
ina	hidu	hiû^{n}ni (his mother)	ehû^{n}, eha^{n}
i	i	i-da	iha
dote	ampa	tcaceda, tcacera	taită; tutĕ (throat)
wa^{n}ji	nuetsa	-cana	mi^{n}, mi^{n}xti
apa	pa	..... (in composition)	pĕ
maghaju	xade	niju	niji
tañka	itaku	wai-tcke	etuñke (his sister)
iyotañka	amaki	năñka	kni^{n}; nika, niñka (or std.)
çakpe	akama	.....	capĕ
tca^{n}di	ope	dani	tani
hi	hi	hida, hira	hi
oto^{n}we	ati	tci-nañka	ta^{n}wa^{n}; tû^{n} (abbr.)
tca^{n}	mina	na^{n}	jă^{n}, jû^{n}
u^{n}	mido	.....	uñkuwe
mini	mini	ni	ni
zi	tsi	zi	zi

(evidently misprinted), and "Onspée." It need occasion no surprise that the term appears alongside of the more common name Ofogoula in three of these cases. "Ofogoula," whether it was or was not derived from the term current within the tribe, was the one which had been adopted into Mobilian, the trade language of the lower Mississippi. The fourth is from the Jesuit Father Gravier who got all of his information from Father Davion at the Tunica mission or else from Tunica Indians directly. It is only natural that they should have employed merely the term current among themselves. Later, when the French came to know these Indians better, the foreign designation disappears, naturally enough, and only the name Ofogoula remains.

This latter form certainly contains the Choctaw and Mobilian ending okla, people, and since ofe means "dog" in the same languages it was natural that Du Pratz should translate the whole "dog people." In Bulletin 47 I expressed the opinion that this was due to a confusion of the native name of the tribe, Ofo, with the Mobilian word ofe.[10] It is, however, possible that the Mobilian designation had been completely taken over by the people to whom it was applied. At any rate there are other evidences that the Ofo were at times actually called "Dog People." Thus in an account of the route from the Illinois by the Mississippi River to the Gulf of Mexico by Tonti, written between 1685 and 1690, he speaks of "The Ionica (Tunica), Yazou, Coroa, and Chonque . . . . on the river of the Yazou" scattered along its lower course.[11] The Ofo is the only known tribe to which the word Chonque might apply and it closely resembles the common Siouan term for "dog." In Ofo this would be atchuñki (achunke), but Tonti had Quapaw interpreters with him at times and in Quapaw it would be cuñkĕ (shunke). The name appears once more in the *Carolana* of Daniel Coxe, who says: "Ten leagues higher [on the Mississippi above the mouth of a river called "Matchicebe" upon which dwelt the Mitchigamia], on the east side, is the river and nation of Chongue, with some others to the east of them."[12] It is also laid down upon his map. In this latter case there is nothing to identify the tribe mentioned with the Ofo except the resemblance between the name applied to them and that used by Tonti, and our inability to identify them with any other people.

The map and text of Coxe present us, however, with another possibility which seems at one and the same time to throw more light on

[10] Bur. Amer. Ethnol. Bull. 47: 10.
[11] French, Hist. Coll. La.: 82. 1846.
[12] Coxe, Carolana, 12, 1741, and map.

the subject and to add to its confusion. This is connected with a people called by Coxe "Ouesperies," the similarity of whose name with the Tunica name for the Ofo was first suggested by Mr. W. E. Myer. After describing the Quapaw villages at the mouth of the Arkansas River Coxe says: "Ten leagues higher is a small river named Cappa, and upon it a people of the same name, and another called Ouesperies, who fled to avoid the persecution of the Irocois, from a river which still bears their name, to be mentioned hereafter."[13] The river "Cappa" was perhaps the St. Francis but an exact identification of it is here unnecessary. The river whence this tribe had come seems to have been the Cumberland or a branch of the same, judging from Coxe's description: "South of the Hohio is another river, which about thirty leagues above the lake is divided into two branches; the northerly is called Ouespere, and the southerly the Black River; there are very few people upon either, they having been destroyed or driven away by the aforementioned Irocois."[14] The Tennessee is described immediately afterward. If Mr. Myer's suggestion is correct, we must then assume a northern origin for the Ofo and a relatively recent southward migration on their part.

Early literature contains no further mention of this tribe under the form of the name which Coxe uses, but we know of a tribe in the region which had a strikingly similar history and whose identity is shrouded in equal mystery.

This first appears on Franquelin's map of 1684 in what is now southern Ohio in the form "Mosapelea" under which is added "8 Vil. detruits." The destruction of these villages must have taken place at least five years earlier since the tribe is placed on the eastern bank of the Ohio on Marquette's map, and, as Hanna has shown, it was evidently the unnamed tribe visited by Marquette and his party and described as having had communication with Europeans and being provided with firearms.[15] This is what the missionary has to say of the tribe:

"While thus borne on at the will of the current, we perceived on the shore Indians armed with guns, with which they awaited us. I first presented my feathered calumet, while my comrades stood to arms, ready to fire on the first volley of the Indians. I hailed them in Huron, but they answered me by a word, which seemed to us a declaration of war. They were, however, as much frightened as ourselves, and what we took for a signal of war, was an invitation to come near, that they might give us food; we accordingly

[13] Ibidem, 11.
[14] Ibidem, 13.
[15] Hanna, The Wilderness Trail, II: 99–100.

landed and entered their cabins, where they presented us wild-beef and bear's oil, with white plums, which are excellent. They have guns, axes, hoes, knives, beads, and double glass bottles in which they keep the powder. They wear their hair long and mark their bodies in the Iroquois fashion; the headdress and clothing of their women were like those of the Huron squaws.

"They assured us that it was not more than ten days' journey to the sea; that they bought stuffs and other articles of Europeans on the eastern side; that these Europeans had rosaries and pictures; that they played on instruments; that some were like me, who received them well. I did not, however, see any one who seemed to have received any instruction in the faith; such as I could, I gave them with some medals."[16]

From the Huron resemblances noted by Marquette Shea suggests an Iroquoian relationship for this people but nothing certain can be deduced from his words and the old home of the Monsopelea was not far from the Erie and other Iroquoian peoples from whom the customs noted might have been derived. Lower down Marquette was informed by the Quapaw "that the Indians with fire-arms whom we had met, were their enemies who cut off their passage to the sea, and prevented their making acquaintance of the Europeans, or having any commerce with them; that, besides, we should expose ourselves greatly by passing on, in consequence of the continual war-parties that their enemies sent out on the river; since being armed and used to war, we could not, without evident danger, advance on that river which they constantly occupy."[17] It is probable that the explorers confounded what was said about this particular enemy tribe which they had met with accounts of other enemy tribes, and either Marquette or those who read his narrative not unnaturally assumed that the fire-arms and other European goods were brought from the mouth of the Mississippi. They therefore supposed that there must be another settlement of the same enemies below them and so it is represented on the maps of Thevenot and Joliet. Thevenot also gives "Aganahali" as the name of a tribe associated with the Monsopelea. As there was no European settlement nearer the mouth of the Mississippi than the Apalachee country of Western Florida and the Spaniards were not allowed to furnish the Indians with fire-arms, it must be supposed that they had obtained their weapons either from the English in Virginia or the Dutch of New Netherlands.

Under this name, or this form of the name, the tribe appears but once afterward. When La Salle stopped at the Taensa village on what is now called Lake St. Joseph, Louisiana, Tonti says:

[16] Shea, Discovery and exploration of the Mississippi Valley, 43–44.
[17] Ibidem, 47–48.

"The next day a chief of the Mosopellea, who after the defeat of his village has asked the chief of the Tahensa for permission to dwell with him, and dwelt there with five cabins, went to see M. de la Salle, and having said that he was a Mosopellea, M. de la Salle restored to him a slave of his nation, and gave him a pistol."[18]

From this time on the tribe of the Monsopelea, unless disguised under some other name, disappears from history as absolutely as if the earth had opened and swallowed it up. My belief is that neither did the earth open for its accommodation nor did later explorers manage to pass it by without notice, but that, after having moved from one place to another, it finally drifted to the lower Yazoo to reappear in the records of French Louisiana under the name of Ofogoula.

This view is supported by the following facts:

1. The name Ofogoula does not make its appearance until after that of Monsopelea disappears, and where Tonti employs the word Chonque he does not use any synonymous term known to have been applied to the Ofogoula. With the exception of the use of Ouispe alongside of Ofogoula by three early authorities, a circumstance already explained, the names which I have supposed to be intended for the Ofo are introduced simultaneously only in the work and on the map of Coxe. Coxe enters on his map the Monsopelea, Ouesperie, and Chongue and he speaks of the two last in his text. However, by his own statement his data were collected from many sources and the same tribe may hence have been entered under different names especially if, as was the case with the Ofo, it was frequently changing its location. So far as the name Monsopelea is concerned there is reason to think that Coxe obtained his information from French sources, and at all events he places it erroneously above the mouth of the Ohio instead of below it. It should be added that only one of the names of the seven tribes which he locates upon Yazoo River might possibly refer to the tribe under discussion, the rest being otherwise identified, and this one must almost certainly be excluded also.

2. The history of the Ouesperie of Coxe and the Monsopelea of the French is very similar. Both once lived on or near the Ohio; both were driven away, in the one case by the Iroquois, in the other presumably by the same people; and both fled in the same direction and disappear from history in the same general region.

3. All of the names given to this tribe may be explained as synonyms of two which are known to have been employed for the Ofo. The

[18] Margy, Dec., I: 610.

relationship of "Ofo," "Ofogoula," and "Chongue" has already been explained, and the following table will help us to understand the possible connection between the remainder:

Authority										
Marquette	M	o	n	s	8	p	e	l	e	a
Thevenot	M	o	n	s	ou	p	e	l	e	a
Allouez	M	o	n	s	o	p	e	l	e	a
La Salle	M	o		s	o	p	o	l	e	a
Tonti	M	o		s	o	p	e	ll	e	a
Hennepin	M	a	n	s	o	p	e	l	e	a
Douay	M	a	n	s	o	p	e	l		a
Franquelin	M	o		s	a	p	e	l	e	a
Marquette	M	o	n	s	ou	p	e	r	e	a
Coxe		Oue		s		p	e	r	ie	
Coxe		Oue		s		p	e	r	e	
Gravier		Ou	n	s		p	ik[ie?]			
La Harpe		O	n	s		p	ée			
Pénicaut		Ou		ss	i	p	é			
Iberville		Oui		s		p	e			
Swanton (1908)		Û		sh		p	I			

Virginia documentary history shows that a Siouan tribe called Moniton ("Big Water People") were living on or near the Kanawha River, West Virginia, as late as the latter half of the seventeenth century.[19] If my hypothesis, as above outlined, is correct there was also, down to the historic period, a Siouan tribe just beyond them in southern Ohio. At the same time it was well-known among the Indians along the middle course of the Mississippi that the Arkansas tribe, known to us in later times as Quapaw, had formerly dwelt on that part of the Ohio above its junction with the Wabash. Besides the published statements to that effect[20] may be cited the following excerpt from an unpublished French document, a copy of which is in the Manuscripts Division of the Library of Congress. The writer of this document enumerates five rivers falling into the Wabash, by which he means our present Wabash *and* that part of the Ohio between the junction of the two streams and the Mississippi, and he calls the third of these, now known as part of the Ohio proper, "Rivière des Accansa qui autres fois y demeuroient et ont abandonné leur village." The intimate linguistic relationship of the Osage, Kansa, Omaha, and Ponka with this tribe and their own traditions indicate a migration from the Ohio rather than the reverse, while the separation of the Iowa, Oto, and Missouri from the Winnebago seems to have been fresh in the minds of two of these peoples down into the last century.

[19] Alvord and Bidgood, First exploration of the Trans-Allegheny region, 87. 1912.
[20] See Bur. Amer. Ethnol. Bull. 30, article on Quapaw.

The occupancy of the territory of our Middle West between the great Lakes and the Ohio by Siouan tribes seems therefore to rest on grounds almost historical. With the strong indications now at hand there seems reason to think that a close comparative study of the Siouan dialects would enable us to reconstruct the general outlines of their ancient geographical positions with considerable accuracy. If present indications are not deceptive, when that is done we shall find that they fell into four major linguistic groups; a northeastern, consisting of the ancestors of the later Siouan tribes of Virginia, the Hidatsa, Dakota, Biloxi, and Ofo; a southeastern, including most of the later Siouan peoples of the two Carolinas; a southwestern composed of the five tribes of Dorsey's Dhegiha group; and a northwestern, Dorsey's Tciwere.[21]

Admittedly there is much of speculation in all this, but I have considered that the facts are of sufficient importance to both the ethnologist and the archaeologist of the Ohio region to present them in a usable form.

PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

PHILOSOPHICAL SOCIETY OF WASHINGTON

870TH MEETING

The 870th meeting was held in the Cosmos Club auditorium, Saturday, October 21, 1922. It was called to order at 8:15 p.m. by President Crittenden. The attendance was 62.

Mr. WILLIAM BOWIE made a report on *The meetings of the International Geodetic and Geophysical Union and of the International Astronomical Union.* It was discussed by Messrs. PAWLING and WOODWARD.

Author's Abstract: The speaker prefaced his remarks by outlining the status of international scientific cooperative efforts before the outbreak of the war. Some years ago it was felt by scientists in various countries that it was necessary to cooperate to avoid duplication of effort and in order that each should know what methods and instruments were being used by others. Such desire on the part of scientists led to the formation of a number of associations, notably those of Geodesy, Seismology, Astronomy, Meteorology, and Geology.

The world war greatly interfered with international scientific cooperation and many of the associations were able to maintain only a nominal existence, through the efforts of the neutral nations of Europe.

Shortly after the close of the war there was held a meeting, in July, 1919, at Brussels, which provided for the creation of an International Research Council, with a number of branches called Unions, which, in turn, were subdivided into Committees or Sections. Two of the Unions created at

[21] I have purposely left the Mandans unplaced, but I do not believe that they will be found to occupy a position apart from all of the other groups.

Brussels were the International Geodetic and Geophysical Union and the International Astronomical Union. The former was divided into the Sections of Geodesy, Seismology, Meteorology, Terrestrial Magnetism and Electricity, Physical Oceanography, and Volcanology. The International Astronomical Union was divided into a number of Committees, each of which deals with some phase of astromical science.

It was proposed at Brussels that the two Unions should meet three years afterward at a time and place to be agreed upon. In the fall of 1921 the officers of the two Unions announced to the countries adhering to these Unions that the Italian scientists had invited them to meet in Rome, April 20, 1922. This date was later changed to May 2 because a large conference had already been planned for the latter part of April in Rome and it would have been difficult for the delegates to the two Unions to secure satisfactory hotel accomodations.

On the first day of the conference the delegates registered and presented their credentials, then attended the opening exercises at which the King of Italy and many other dignitaries were present. On the second day there were meetings of the two Unions. On the last day of the conference, which was May 10, there were also meetings of the two Unions, at which reports of certain committees which had been appointed during the first meetings were received, discussed and acted upon. During the intermediate days there were almost continuous meetings of the several Sections of the International Geodetic and Geophysical Union and of the Committees of the International Astronomical Union.

Much work was done at Rome, although there was some feeling that the time was quite short for such a large gathering and so many interests. It was practically impossible for a delegate representing one branch of science to attend more than the meetings of his own Section or Committee. However, the delegates left Rome with a feeling that much had been gained and that International cooperation in science had been restored and is now on a very firm basis.

Local scientists and officials entertained the delegates in the manner usual at such international scientific assemblages.

MR. ROBERT S. WOODWARD, presented a paper on *The compressibility of the Earth*. It was discussed by Messrs. LAMBERT, HAWKSWORTH, BOWIE, CURTIS, and L. H. ADAMS.

Author's Abstract: This paper considers the earth as a gravitating mass of homogeneous, concentric spherical shells in which there is continuity of increase in density from the external surface to the center of the sphere. The mathematical problem thus presented is defined by four relations, namely: (1) Poisson's equation, connecting gravitational potential and density at any point of the mass; (2) the hydrostatic law connecting potential, stress and density at any point of the mass; (3) the hypothesis of Legendre-Laplace, postulating that the rate at which stress increases with density is proportional to the density; and (4) the law of conservation of mass.

The problem is worked out on the assumption that the mean density of the earth is exactly twice the density of the surface crust. Data dependent on direct observations of the gravitation constant and on its relation to the mean density of the earth were cited to show that the mean density of the earth is very near to 5.514; while reference was made to the more recent investigations which seem to prove that the crustal density of the earth is very near to 2.76.

Expressed in a concrete application, the resulting compressibility is such that if the pressure of the atmosphere were doubled the surface of the earth

would move inwards nearly two meters (more exactly 185 centimeters, or 6.06 feet).

It was pointed out that this degree of compressibility finds important applications in geology, since it indicates that crustal subsidence and elevation amounting to hundreds, if not thousands, of meters may be due to variations in surface loads.

Reference was made to an earlier investigation by the author of "The effects of secular cooling and meteoric dust on the length of the terrestrial day" (Astronomical Journal, No. 502, July, 1901), in order to show that neglect of the compressibility of the earth in that investigation led to no sensible error.

871ST MEETING

The 871st meeting was held in the Cosmos Club auditorium, Saturday, November 4. It was called to order by President CRITTENDEN at 8:35 p.m., with 47 persons in attendance.

A paper by F. WENNER, NINA FORMAN, and A. R. LINDBERG on *The variation of metallic conductivity with electrostatic charge* was presented by Mr. Wenner. It was discussed by Mr. TUCKERMAN.

Author's Abstract: In the spring of 1921, Professor H. A. Perkins presented a paper to the American Physical Society in which he stated that a simple conception of metallic conduction based on moving electrons seemed to justify the assumption that a negative charge should increase the conductivity of a circuit and a positive charge should decrease it. He tested this assumption as follows:

A primary coil was wound upon a glass cylinder inside of which fitted a similarly wound secondary coil. The primary was excited through a 60 cycle circuit while the secondary circuit carefully insulated throughout included a moving coil galvanometer. At the same time the secondary circuit was given an alternating charge from one terminal of a high tension transformer, the other terminal being grounded. In operation the galvanometer was not affected either by the charging potential alone or by the induced alternating current alone. If, however, the induced current and the charging potential were both present, a large deflection of the galvanometer was observed. This phenomenon behaved in a perfectly regular manner and reversed if the phase of the charging E. M. F. were reversed by interchanging the terminals of the transformer.

An effect such as that just described would be of sufficient importance to require careful investigation, and some modification of our notions of metallic conduction. However, on repeating the experiment using reasonable precautions to prevent disturbing influences we observed no change in the deflection of the galvanometer on changing the phase between the current in and the potential of the test circuit. The arrangement of the circuit was such that on the basis of the explanation given the effect should have been larger than in the original experiment while the sensitivity of the galvanometer was such that a considerably smaller direct component of the current could have been detected.

This paper will be published in full in the December issue of the Physical Review.

By invitation, Mr. R. GILCHRIST presented a paper on *A new determination of the atomic weight of osmium*,[1] which was discussed by Messrs. HEYL, PAWLING, BURGESS, and HUMPHREYS.

[1] From a dissertation entitled "The Preparation of Pure Osmium and the Atomic Weight of Osmium" submitted to The Johns Hopkins University, June, 1922, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Author's Abstract: Pure osmium was prepared by making use of the following reactions. When OsO_4 and constant boiling HCl, in the presence of a small amount of C_2H_5OH, were heated in a reflux apparatus for about three hours, the OsO_4 was converted to chlorosmic acid, H_2OsCl_6. After evaporation to a syrup and dilution with H_2O, the osmium was precipitated as the brick red $(NH_4)_2OsCl_6$, with NH_4Cl. The $(NH_4)_2OsCl_6$ was reduced to metal in H_2. The H_2 was completely removed by nitrogen while the metal was still red hot. On cooling, gray osmium sponge resulted which was not attacked by the oxygen of the air.

The reagents employed in the above reactions were volatile ones which allowed of easy purification. The purification cycle could be repeated conveniently. Spectroscopically pure osmium was thus obtained.

The reaction between OsO_4 and 20 per cent HBr took place without the addition of C_2H_5OH, and was complete in about one-half hour. Bromosmic acid, H_2OsBr_6, was obtained in this case from which NH_4Br precipitated the black $(NH_4)_2OsBr_6$.

Two sources of osmium were used for the preparation of the salts for analysis. $(NH_4)_2OsCl_6$ was made from osmium obtained from Baker and Company. $(NH_4)_2OsBr_6$ was made from osmium obtained in the working up of some osmiridium residues recovered during refining of Russian crude platinum.

The results of the analyses were as follows:

BAKER AND COMPANY $(NH_4)_2OsCl_6$, SERIES I

EXPERIMENT	WEIGHT OF $(NH_4)_2OsCl_6$ IN VACUO	WEIGHT OF OSMIUM IN VACUO	OSMIUM	ATOMIC WEIGHT
	grams	*grams*	*per cent*	
1	1.46116	0.63688	43.587	
2	2.80587	1.22226	43.560	
3	2.32007	1.01021	43.542	
4	1.93756	0.84390	43.555	
5	2.92857	1.27597	43.569	
			43.563	192.074

$(NH_4)_2OsCl_6:Os = 100:43.563$

RUSSIAN $(NH_4)_2OsBr_6$, SERIES II AND III

EXPERIMENT	WEIGHT OF $(NH_4)_2OsBr_6$ IN VACUO	WEIGHT OF OSMIUM IN VACUO	OSMIUM	ATOMIC WEIGHT
	grams	*grams*	*per cent*	
1	4.17909	1.13522	27.164	
1	1.72778	0.46909	27.150	
2	0.98661	0.26783	27.146	
			27.153	192.172

$(NH_4)_2OsBr_6:Os = 100:27.153$

Average of eight experiments = 192.111

Os = 192.1

The complete paper will be published in the near future.

Mr. R. B. SOSMAN prefaced his paper on *Theory of the structure and polymorphism of silica*, by an informal communication describing an *Improvement on Whitlock's method of constructing models of crystal structure*, in which glass rods carrying the "atoms" are replaced by threaded brass rods. The paper was discussed by Mr. WHITE.

Author's Abstract: There exists a wide variety of experimental data on the forms of silica, and particularly on quartz, which have never been assembled and explained on the basis of a single consistent set of hypotheses as to the ultimate structure of this substance. The author has attempted to provide such a set of hypotheses, based upon the general knowledge already gained concerning the structure of matter in general and silica in particular. It is believed that the silica atom-triplet maintains a certain degree of individuality in its amorphous and crystalline states as well as in its compounds, and the freedom of its oxygen atoms to change their positions with respect to the silicons is restricted. The triplets are assumed to assemble into chains or threads in the liquid and glassy states, and a thread structure persists in the crystalline states (cristobalite, tridymite, chalcedony, quartz). The high-low, or alpha-beta inversions in all the forms are thought to be due to the same underlying change, namely, a change in the state of motion of some subsidiary part of the atom-triplet, perhaps a pair of revolving electrons; this change results in an alteration of the relative positions of the two oxygen atoms attached to a silicon atom. Analogous phenomena of polymorphism are indicated in the silicates and in the dioxides of the other elements having an external electron structure similar to that of silicon (titanium, zirconium, germanium, tin). The paper will be published in full in the Journal of the Franklin Institute.

All three of the above papers were illustrated by lantern slides, and Mr. SOSMAN also showed models.

H. H. KIMBALL, *Recording Secretary.*

SCIENTIFIC NOTES AND NEWS

DR. J. S. AMES, professor of physics, Johns Hopkins University, gave the first of a series of lectures on the Quantum Theory at the Bureau of Standards on January 8, 1923. It is the aim of this series of lectures to give a broad survey of the Quantum Theory to those unfamiliar with it, the final lectures to be given by Dr. A. Sommerfeld.

In his lecture Dr. Ames showed just where the hypothesis was introduced into physics. This was in the case of radiation from a black body, where the equations derived by methods based on classical mechanics were at variance with experiments. Planck made a modification, proposing that the energy vary by steps or by "quanta" hv, where v is the frequency of the radiation and h is a universal constant. This gave a law which agreed with experiment. That is, the theoretical black body was closely approximated in practice and the energy of the emitted radiation over the entire spectral range agreed in amount with that calculated from the radiation law.

A relation for the specific heat of a substance was derived as a function of temperature and hv, thus involving the hypothesis. The calculated and experimental values of those parts vital to the hypothesis were in agreement.

The mathematics essential to the development of two laws was given in the lecture. Dr. Ames emphasized that the Quantum Hypothesis rests on

an empirical basis and that it is accepted because it agrees with experiment in widely separated branches of physics.

MR. JOHN B. HENDERSON, a regent of the Smithsonian Institution, died January 4, 1923, in his fifty-third year. Mr. Henderson was born at Louisiana, Missouri, February 18, 1870. In spite of his many legal, political, and diplomatic activities he devoted much of his life to the study of marine biology and especially to the making of valuable collections of specimens many of which are now to be seen in the U. S. National Museum. Among his writings may be mentioned "*The Cruise of the Tomas Barrera.*" Mr. Henderson was a member of the ACADEMY and the following affiliated societies: Archeological, Biological, Geological, and Historical.

DR. A. S. HITCHCOCK of the Bureau of Plant Industry has been elected president of the Biological Society of Washington for 1923.

The election of Dr. T. WAYLAND VAUGHAN as president of the ACADEMY for 1923 was announced at the annual meeting on January 9.

DR. C. D. WALCOTT, Secretary of the Smithsonian Institution, was elected president of the American Association for the Advancement of Science at its annual meeting held in Boston, December 26–30, 1922.